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The COVID-19 Shutdown: Short-term Actions and Lessons Learned by Ten African Great Ape Sanctuaries

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Abstract: African sanctuaries play a key role in the battle against the illegal trade of orphaned apes by rescuing and rehabilitating displaced animals and providing them lifelong care. Due to the global pandemic of COVID-19, sanctuaries were forced to close their doors and take precautionary measures to avoid contagion. This study aimed to identify short-term actions the sanctuaries took in the three to five months following the announcement of the pandemic. A survey was administered to ten Pan African Sanctuary Alliance members, in eight different countries, housing African apes. Thematic analysis was used for data analysis and four themes were identified: "Special measures implemented by Sanctuaries to deal with COVID-19," "External support," "Impact of COVID-19 on great ape sanctuaries" and "Economic impact." The pandemic greatly impacted resources, money, food, medical supplies and staffing. Our results reveal how quickly sanctuaries reacted to the crisis and the need for the creation of contingency plans to prevent the impact of future pandemics. We also identified that sanctuaries need to be able to: a) adapt to the changing times by developing fundraising strategies through social networks and by adopting innovative approaches such as virtual tours; and b) assess and improve the health of staff and their families through an employee health program following the One Health approach.

Key words: *Pan troglodytes, Gorilla gorilla, Pan paniscus,* Sanctuary, Conservation, COVID-19, Great apes, Contingency plan, One Health.

INTRODUCTION

On the IUCN Red List of Threatened Species, all great apes except humans are listed as endangered or critically endangered (GRASP & IUCN 2018). Despite long-term investments and funding of great ape conservation in Africa, wild populations of gorillas (*Gorilla* ssp), chimpanzees (*Pan troglodytes* ssp) and bonobos (*Pan paniscus*) continue to decline (Bettinger *et al*. 2021).

The greatest threats that African apes face are loss of habitat (through logging, mining, and land conversion), bushmeat hunting, and the live ape trade (Amman 2001). The adult females are killed for bushmeat, and the infants that survive end up as pets in a local village, are sold as pets to wealthy families or, when possible, are rescued and placed into a sanctuary (Kemf & Wilson 1997).

Due to the increasing number of orphaned apes, especially chimpanzees, the number of chimpanzee sanctuaries in West and Central Africa has grown steadily (Cox *et al*. 2000). Sanctuaries are a product of the conservation crisis facing apes in Africa and their role should not be undervalued (Schoene & Brend 2002). While most sanctuaries rescue and rehabilitate displaced animals by providing lifelong

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care, in some cases they release primates back into their natural habitats (Trayford & Farmer 2013; Ferrie *et al.* 2014).

The work conducted by sanctuaries has evolved to include a broader mission to address the root causes of the influx of primates into sanctuaries, thus integrating care for rescued animals with habitat protection and law enforcement (Farmer 2002), conservation education (Kuhar *et al.* 2012), community development (Chesney *et al.* 2021), and non-invasive research (Ortín *et al.* 2019). They also contribute to the local economy through the creation of employment opportunities and by attracting tourists (Farmer 2002; Ferrie *et al.* 2014).

Despite the benefit to increasing public awareness, the addition of visitor programs to rehabilitation centers can increase the level of exposure to human-carried pathogens. And, while basic animal husbandry practices in ape sanctuaries are a critical part of providing care, these daily routines involve close interactions between apes and human staff during the feeding and rehabilitation process. The existence of sanctuaries, therefore, presents the risk of disease transmission that potentially exposes naïve populations of nonhuman primates to human pathogens and vice versa (Mugisha *et al.* 2011).

Biological similarities between humans and the other great apes predispose them to cross-species pathogen transmission (Wolfe *et al.* 1998; Wallis & Lee 1999; Boesch 2008; Davies & Pedersen 2008). Viruses that are relatively benign in humans can cause lethal outbreaks in ape populations (Köndgen *et al.* 2008; Patrono *et al.* 2018; Negrey *et al.* 2019). Due to their rapid spread and difficult containment, airborne pathogens raise some the greatest concern.

A recent study by Melin *et al.* (2020) suggests that catarrhines are likely to be susceptible to infection by SARS-CoV-2. Therefore, we should add SARS-CoV-2 to the list of known common human respiratory viruses that have already caused lethal outbreaks in habituated great apes in the wild (Goodall 1986; Boesch 2008; Mugisha *et al.* 2011; Patrono *et al.* 2018).

Due to the global pandemic of COVID-19, like many other organizations and businesses, sanctuaries were forced to close their doors to combat the pandemic. Both apes and their human caretakers were at risk from the highly contagious novel coronavirus and sanctuaries needed to take precautionary measures to avoid contagion. Unlike field projects that could be put on hold, sanctuaries were not able to close because the ape residents depend entirely on humans for their food and care.

The present study analyzed responses from a questionnaire administered to ape sanctuaries, describing events following the start of the pandemic. We sought to: 1) identify short-term actions the sanctuaries took in the three to five months following the announcement of the pandemic, and 2) report lessons learned by sanctuaries from a sudden shut down to better adapt for futures threats.

MATERIALS AND METHODS

Sample

Our sample included ape sanctuaries that met the following criteria: a) located on the African continent; b) working in the care and rescue of great apes; and c) Pan African Sanctuary Alliance (hereafter PASA) member. We chose only sanctuaries that are PASA members to homogenize the sample as much as possible, despite the differences that exist between the various African countries involved.

PASA was developed in 2000 to support, assist, and encourage sanctuaries in their efforts to protect primates. It proposed to do this by promoting the highest standards of captive animal husbandry, allowing its members to build on their competence by providing forums for the exchange of best practices, by providing training, and by acting as a network where sanctuary managers can share information and discuss issues of mutual concern (Farmer 2002; Schoene & Brend 2002; Stokes *et al.* 2018).

Data collection

Data were collected through a semi-structured questionnaire consisting of dichotomous (yes/no), multiple choice, and open-ended questions (see Appendix 1).

In order to avoid linguistic confusion, each sanctuary received the questionnaire in the vehicular language of the person for whom the questionnaire was destined (Spanish, French, or English).

The questionnaire sought to address participant opinions and explanations on these key topics: a) description of the "new COVID reality" around the sanctuary; b) external support against COVID-19; c) impact of national border closure; d) measures taken to prevent the spread of COVID-19; and e) impact on funding.

Questionnaires from the sanctuaries were translated into English (when necessary) before being compiled.

Participants

Between June and August 2020, we contacted 18 PASA ape sanctuaries and received responses

from 10. The following sanctuaries participated in this study: Ape Action Africa (Cameroon), Centre de Conservation pour Chimpanzés (Republic of Guinea), Chimfunshi Wildlife Orphanage (Zambia), J.A.C.K "Jeunes Animaux Confisqués au Katanga" (Democratic Republic of Congo), Lola Ya Bonobo (Democratic Republic of Congo), Lwiro Primate Rehabilitation Centre (Democratic Republic of Congo), Ngama Island Chimpanzee Sanctuary (Uganda), Parc de Lékédi (Gabon), Sweetwaters Chimpanzee Sanctuary (Kenya), and Tchimpounga Chimpanzee Rehabilitation Centre (Republic of Congo).

Data Analysis

This study follows the thematic data analysis methods used by Braun and Clarke (2006), to investigate how participants experienced the impact of the global shut down resulting from the COVID-19 pandemic and the concrete actions adopted in response to the crisis. We chose a qualitative approach as we considered it the most appropriate method to understand the phenomenon assessed. According to Braun and Clarke (2006: 79), "thematic analysis is a method for identifying, analysing and reporting patterns (themes) within data."

The analysis required transcription of the data and re-reading the data, noting initial ideas, to identify potential themes. Both authors, in a double-blind process, carried out the analysis. The second level of analysis involved the process of reviewing these initial notes and coding meaningful elements of the data in a systematic fashion across all the entire data set, collating data relevant to each code. The final step entailed collating all codes in potential themes in order to obtain thematic categories and thematic subcategories that allowed us to address the objectives of the research. During this process, recursive loops were carried out in order to check that the procedure was being applied correctly.

RESULTS

The thematic analysis produced four themes: 1) Special measures implemented by sanctuaries to deal with COVID-19; 2) External support; 3) Impact of COVID-19 on great ape sanctuaries; 4) Economic impact. These themes are described in Table 1.

1. Special measures implemented by sanctuaries to deal with COVID-19

The following three measures were adopted: centre closure, confinement or semi-confinement of the staff, and tightening of hygiene measures.

All sanctuaries, without exception, had to close their doors to the public and volunteer and research programmes were temporarily cancelled. Additionally, six sanctuaries confined their staff on site, three sanctuaries employed a semi-confinement strategy, while one sanctuary did not confine any staff.

Those that had not completely confined staff at the sanctuary adopted measures such as: a) on site shift work rotations; b) longer shifts; c) reduction of staff mobility; d) transport to and from the sanctuary in a private vehicle to avoid public transport; e) raising awareness of protective health measures at home; and f) distribution of soap.

In terms of confining staff to the site, the following items were most often reported in response to the questionnaire: a) staff numbers were reduced in some cases, as only confined staff were kept employed; b) separation of staff members and their families due to confinement or, in some cases, lodging the children of female staff members confined at the centre; and c) food and medical assistance for the families of confined staff.

Additionally, all hygiene measures were tightened. A complete list of measures put in place by sanctuaries is shown in Table 2.

2. External support

Eight of the ten participating sanctuaries reported that they had followed instructions from PASA and/or the IUCN SSC Primate Specialist Group for the handling of animals. Among these eight, one also mentioned having followed instructions from GRASP (Great Ape Survival Partnership) and the government.

Only three centers received government support for COVID response. This consisted of direct information and instructions to help face the pandemic, logistical support, and health supplies.

Eight of the ten sanctuaries received external support for COVID response in the form of funding. One sanctuary received a supply of face masks but no financial aid, while the remaining sanctuary received no outside help.

Three of the sanctuaries reported having requested funding in order to increase the budget due to the pandemic, as well as having made an effort to increase donations through social media networks.

3. Impact of COVID-19 on great ape sanctuaries

We summarize the impact of COVID-19 on sanctuaries in Table 3.

Table 1. Themes and sub-themes obtained through the thematic analysis.

Special measures implemented by Sanctuaries to deal with COVID-19
• Centre closure
• Confinement or semi-confinement of staff on site
• Hygiene measures
External support
• Instructions from specialised organisations
• Government support
• Emergency funds
Impact of COVID-19 on great ape sanctuaries
• Staff members blocked outside the African continent due to the border closure
• Difficulties in obtaining medicines and anaesthetics due to border closures
• The availability of food for the animals decreased in both type and quantity
• Interrupted educational activities, both on site and in schools
• Reintroduction programmes postponed
Economic impact
• Sanctuaries have suffered a decrease in their sources of income
• Much funding from NGOs, individual donors, zoos, foundations and commercial sponsorship, both locally and overseas, have been affected
• Additional expenses

3.1. Difficulties in obtaining medicines and anaesthetics due to border closures

As a result of border closures during the pandemic, seven sanctuaries reported difficulty in acquiring materials from abroad such as medicines and anesthetics which generally come from Europe. Furthermore, the sanctuaries found sparse availability of supplies locally, as well as a rise in cost and logistical shipping issues.

3.2. The availability of food for the animals decreased in both type and quantity

Nine of the sanctuaries reported difficulties in providing basic food for the apes in their care. The causes and consequences reported on the questionnaire were as follows: increased prices; less local cultivation of certain vegetables; less variety of foods due to strong demand; shipment failure and increased transport fees.

3.3. Reintroduction programmes

Two of the three centres that carry out reintroductions have had to modify their programmes due to COVID-19, limiting the release of animals or postponing the programmes altogether.

4. Economic impact

All sanctuaries reported a decrease in income or funding. Among all of the participating sanctuaries, eight reported being heavily dependent on the income generated by visitors, ecotourism, volunteering, research, and merchandising. The remaining two sanctuaries do not base their income on visitors as they are never open to the public.

Eight of the ten sanctuaries reported being heavily dependent on private donations and overseas funds. According to those interviewed, many overseas funds and donations were modified or, in some cases, suspended for the remainder of 2020.

DISCUSSION

Our research has shown how quickly sanctuaries reacted to the crisis in such a short period. Particularly during the initial months of the outbreak, when the measures adopted by the governments were to

Table 2. Summary of measures taken in relation to the animal handling, staff, and food.

Staff hygiene measures	
• Risk assessment	• Frequent hand-washing
• Education campaigns on hygiene measures	• Personal protective equipment when dealing with animals
• Daily health checks	
• Body temperature checks	• Use of face shields while feeding
• Use of gloves	• Increase in hand washing stations
• Wearing of masks	• Distribution of soap
Hygiene measures in the facilities	
• New disinfection protocols	• Avoidance of direct contact with animals
• Limited caregiver access between groups	• Daily disinfection of surfaces
• Avoidance of staff members crossing paths	• Footbaths at each entrance or exit of the facilities
Food hygiene measures	
• Disinfection of food before entering the sanctuary	• Disinfection of food before distribution to the animals
• Food products quarantined for 24 hours after arrival at the centre	• Always same people allowed to enter/leave the sanctuary to buy food for animals and staff

close the borders and resources became limited, the sanctuaries implemented new protocols that would stop the spread of the virus and ensure medical attention and good nutrition for their residents.

Our study indicates that one of the largest impacts on sanctuaries has been economic. As expected, all sanctuaries suffered a decrease in their sources of income. For some sanctuaries this was perceived as a result of the closure of the centre to visitors. For others, this was due to loss of funding from supporting NGOs, individual donors, foundations, and commercial sponsorships, both local and international.

Zoos around the world regularly provide funding and technical support, allowing PASA to continue its efforts to secure a future for African great apes and their habitats (Stokes *et al.* 2018). Due to the pandemic, many zoos have closed their doors to the public and have also suffered a considerable loss of income. A logical outcome may be that many zoos have been unable to continue their financial support of African sanctuaries (Pasic & Jovanovich 2020). Moreover, COVID-19 had a major impact on international travel, causing a substantial drop in tourism. The flow of visitors, tourists, volunteers, and researchers, that are an important source of funding for the majority of sanctuaries was suddenly cut off.

The pandemic not only meant the direct loss of funds for sanctuaries. It has also generated new expenses. The cost to purchase anaesthetics and food at their new higher prices, the extra costs to house staff of site, and the additional aid and compensation to employees have also contributed to additional expenses and budget reallocations.

In addition to the economic impact, the second most difficult challenge faced by the sanctuaries has been establishing toughened health protocols for both staff and animals, such as housing all staff on site. Both PASA and the IUCN SSC Primate Specialist Group published special recommendations regarding Best Practices. PASA kept their members informed through a COVID-19 information hub for people who work with primates, created by the University of Minnesota. The IUCN SSC Wildlife Health and Primate Specialist Groups published a joint statement with their recommendations on March 15th, 2020.

Along with actions taken by sanctuaries, the various governments took certain measures - some of which impacted the sanctuaries. Among the most impactful governmental actions noted by the sanctuaries were: national border closures; curfews; mandatory use of medical masks; hand-washing; lockdowns; prohibition of public meetings; awareness campaigns on health measures to avoid COVID-19; and the closure of schools and places of worship.

Combined, our data indicates the need for sanctuaries to develop contingency plans to protect against these issues in case of future outbreaks.

The lessons learned after this sudden "shutting

Table 3. Assessed impact of COVID-19 on sanctuaries. Sanctuaries are identified with numbers (S1, S2…).

Impact	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Staff members blocked outside the African continent (number)	1	2	1	0	0	1	0	1	0	1
Sanctuary affected by the inability to acquire medical supplies from Europe	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Sanctuary affected by the decrease in availability of food and increase of prices	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interrupted educational activities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Reintroduction programmes limited or postponed	N/A	Yes	N/A	N/A	Yes	N/A	N/A	N/A	N/A	No

down" of the world – and the adaptation to it – can constitute the basis for drawing up a contingency plan that will ensure better preparedness for future threats. Having the infrastructure available to house staff, as a measure to deal with future confinements, is one of the measures that a contingency plan should consider, as well as an emergency fund to ensure the sanctuary's financial stability in the face of a crisis of this magnitude.

It is also important to encourage sanctuaries to diversify their sources of income. Many PASA members have already increased their efforts in recent years to have a regular presence on social media, thus creating more connections with potential supporters (James & Keeper 2020). Given the travel restrictions that the COVID-19 pandemic caused, we recommend that sanctuaries adopt innovative approaches to tourism such as virtual tours or other virtual experiences as a way of maintaining visitor interest and support, while also continuing to raise awareness.

Contingency plans for high-risk diseases are presented in detail in the IUCN Guidelines on Best Practices for health monitoring and disease control in great ape populations (Gilardi *et al.* 2015). Anticipating that we will face other emerging and re-emerging diseases in the future, the health of great apes also depends on monitoring the health of any humans who are in close proximity to apes. In fact, many authors note the importance of assessing and improving the health of the people who work and live in great ape habitats, especially those who are frequently in close proximity to wild great apes (Wallis & Lee 1999; Humle 2011; Gilardi *et al.* 2015; Alonso *et al.* 2020; Azevedo *et al.* 2021). The IUCN urges the adoption of a 'One health' approach recognizing that the health of people is closely connected to the health of animals and our shared environment (Karesh & Cook 2009). In this context, the IUCN cites the need for employee health programs for all great ape tourism and research projects to prevent the spread of anthroponoses.

As an example, the Mountain Gorilla Veterinary Project cooperates with local health authorities and other employing organizations to implement employee health programme in Rwanda for the conservation of the mountain gorilla (*Gorilla beringei beringei*) (Ali *et al.* 2004). The programme included rangers, guides, park personnel, researchers and veterinarians, as well as worker family members, with the goal of improving worker health and reducing human-to-gorilla transmission of infectious diseases.

Similarly, in 2007, Conservation Through Public Health, a non-profit, non-governmental organization, implemented a volunteer program to improve human and wildlife health at Bwindi Impenetrable National Park in Uganda. Using the One Health approach, the program promoted family planning, health, and conservation near mountain gorilla protected areas in Uganda and Democratic Republic of the Congo (Kalema-Zikusoka & Byonanebye 2019). Both areas have high poverty levels and human population densities and the work resulted in a reduced incidence of gorilla disease, and greater community support for conservation.

In sum, the major themes identified in this study include financial security, logistical support, and disease prevention measures to ensure the health of both animals and workers during a pandemic. Sanctuaries play a key role in the conservation of great apes in Africa and their ability to learn from this experience can make a difference to their continuity and success in the future.

ETHICS STATEMENT

This research did not need IRB approval because it did not involve the observation of human or nonhuman primate subjects. The study received full ethical approval from the PASA Executive Director. We asked each sanctuary to select the person who responded to our questionnaire, with our commitment to maintain their anonymity.

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Appendix 1.
Questionnaire provided to great ape sanctuaries regarding COVID-19 response.

Question		Answer
1. Description of the situation near the rehabilitation centre		
1.1.	Are you still living the same normality as before the COVID-19 or, on the contrary, do you perceive changes in your area near the rehabilitation centre?	Yes/No
1.2.	Do you know people around you who have died due to COVID-19?	Yes/No
1.3.	Has an information and awareness campaign been carried out with the population concerning basic hygiene measures?	Yes/No
1.4.	Are people respecting these measures? (Washing hands, wearing face masks, maintaining 1.5 meters distance between people, avoiding physical contact, confinement).	Yes/No
1.5.	Which have been fulfilled to a greater extent?	Open answer
1.6.	Who has carried out this information and awareness campaign?	Government/NGO/ Your Center/Others
1.7.	How has this awareness campaign been carried out?	Face-to-face/Radio/ TV/Others
1.8.	Has the government closed schools and places of religious worship?	Yes/No
1.9.	Has there been provisioning of basic food?	Yes/No
2. External support against COVID-19		
2.1.	Have you received basic and concrete instructions on how to deal with the pandemic in your centre?	Yes/No
2.2.	If the answer (below) is "yes", by which agency, institution or centre?	Open answer
2.3.	Have you obtained the support from the public administration (information, material, collaboration of forest rangers) to face this crisis?	Yes/No
2.4.	If the answer (below) is yes, what kind of help have you obtained?	Information/Sanitary material/ Logistic support/Others
2.5.	Have you obtained the support of NGOs, other associations, other recovery centers, zoos or universities to face the crisis (material, funds)?	Yes/No
2.6.	If the answer is yes, what kind of help have you obtained?	Sanitary material/Funds/Others
3. Border closure		
3.1.	Has part of your staff been blocked in her/his country of origin and have been unable to return to the rehabilitation centre?	Yes/No
3.2.	If the answer is yes, what position or responsibility does she/he have?	Veterinary/Animal care manager/ Education manager/ logistic manager/Volunteers/ Researchers/Board direction/ Manager scientific research in protected area/ Others
3.3.	How has the closing of borders affected the supply of medicines or other material that usually buy from other countries?	Open answer

Appendix 1. (continued)

4. Consequences of COVID-19 and measures adopted		
4.1.	What are the exceptional actions/measures that you have implemented to guarantee the safety and health of your primates?	Open answer
4.2.	Has the pandemic hindered the normal provision of animal food in type, quality, variety and price?	Yes/No
4.3.	If the answer (below) is yes, what consequences has it had?	Open answer
4.4.	Do you carry out environmental education and awareness in the rehabilitation centre, at schools or in the community?	Yes/No
4.5.	How has COVID-19 affected education activity?	Open answer
4.6.	Have you carried out any education or awareness campaigns regarding hygienic measures against COVID-19?	Yes/No
4.7.	If the answer (below) is yes, who has been the target audience?	Staff/Community/Others
4.8.	Some of you work in a protected area, natural park or community reserve, where you may carry out scientific studies of biodiversity such as censuses of flora and fauna. With this question we want to know if the current crisis has stopped these activities, if it has led to illegal hunting, if the surveillance patrols by forest guards have stopped and if you have to take any emergency measures.	Open answer
4.9.	Some of you have carried out reintroductions and follow-up of reintroduced groups in protected areas, natural parks or community reserves. If this is the case, we would like to know if this crisis has affected these reintroduction programs in any way and if you have had to take emergency measures.	Open answer
4.10.	Have you continued rescuing primates or have you received notices to be rescued?	Yes/No
4.11.	If the answer is yes, has the frequency with which you received these notices varied?	More frequency/Same frequency/ Less frequency
5. Economic funds		
5.1.	What are the activities from which you normally obtain financial funds? (example: visits to the sanctuary, sponsorship program, volunteering, ecotourism, merchandising…).	Open answer
5.2.	Of these, which have been affected by COVID-19 and how have they affected you?	Open answer
5.3.	To what extent have grants obtained through foundations, philanthropists or other public or private institutions been affected or, on the contrary, are they continuing as normal?	Open answer
6. Final comments		
6.1.	If you could go back in time before the border closed, is there anything you would do differently to be better prepared for the crisis?	Open answer
6.2.	If there is any specific aspect that we have not discussed and you consider it important, we would appreciate if you indicate it in this section.	Open answer